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ABSTRACT

Nine indices were compared for their ability to discriminate gifted and non-gifted students (N=5,647 in grades K-12). Correlation procedures and discriminant analysis were used to examine the following indices: (1) group IQ test scores; (2) individual full scale IQ test score; (3) individual verbal IQ test score; (4) individual performance IQ test score; (5) teacher rating scale; (6) Metropolitan Achievement Test--Reading Comprehension; (7) Metropolitan Achievement Test--Math; (8) parent questionnaire; and (9) class population assessment. The discriminant analysis procedure determined that the variables of Wechsler Intelligence Scale--Revised Full Scale, parent questionnaire, and teacher nomination were the strongest discriminators between gifted and nongifted students. (CL)

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STUDY OF INDICES USED IN THE IDENTIFICATION PROCEDURE FOR GIFTED STUDENTS

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STUDY OF INDICES
USED IN THE IDENTIFICATION PROCEDURE
FOR GIFTED STUDENTS

Objective of the Study:

The object of this study was be to determine which of the nine indices used to identify gifted students are the strongest discriminators between gifted and non-gifted. The indices to be evaluated in this study are: (1) Group IQ test scores - (Otis-Lennon, SAI, 1979), (2) Individual Full Scale IQ test scores- (WISC-R, 1974), (3) Individual verbal IQ test scores- (WISC-R, 1974), (4) Individual performance IQ test scores - (WISC-R, 1974), (5) Teacher rating scale, (6) Reading achievement from the Metropolitan Achievement Test, (7) Math achievement from the Metropolitan Achievement Test, (8) Parent Questionnaire , and (9) Class Population Assessment.

Theoretical Framework:

Identification of students for gifted programs establishes a need for the use of multiple identification instruments (Renzulli, 1976). Martinson (1974) identified the use of group test of intelligence and achievement, teacher nomination, parent information and pupil attainment of student objectives as multiple methods for identification of the gifted. This study conducted for the

National/State Leadership Training Institute on the Gifted and Talented is the basis for the adoption of the nine indices by the district in which the present study was conducted. A review of the current literature revealed there were no studies that compared the identification indices for discrimination between gifted and non-gifted students. Several studies (Alvino, 1981; Consugera, 1982) support the use of multiple identification indices. The present study tests theories about the identification of the gifted to determine which of the indices for identification are actually discriminating between gifted and non-gifted students. The procedure for gifted student identification is in accordance with the state of Texas guidelines set forth in House Bill 72. The following question was examined in the present study, which of the nine indices significantly discriminate between gifted and non-gifted students.

For the purpose of this study the following operational definitions were employed:

Gifted - A student who, by virtue of outstanding mental abilities, is capable of high performance. The student may demonstrate, in any combination, above average achievement or potential in such areas as general intellectual ability, in creative and productive thinking, and leadership ability. This does not include students who demonstrate above average achievement or potential in areas relating to physical abilities. (TEA, 1984).

General intellectual ability - Possessing superior intelligence, with potential or demonstrated achievement in several fields of study; ability to perform complex mental task.

Specific subject area achievement - Possessing superior ability or potential in a specific course of study such as reading or math.

Student objectives - Statement of measurable learner expectations

around which the curriculum and associated activities are based; specific statements designed to measure student progress in attaining a goal; statement of expected student outcomes with specific performance criteria and measurement strategies.

Data Sources:

The district in which this study was conducted has an enrollment of 5,647 students in grades K-12. Of this student population, 24% are minority. The socioeconomic status of the district ranges from low to upper middle income families. The district's program for gifted education is called the Pegasus Program. As of this school year, the Pegasus Program serves students in grades 3 - 7. The program extends upwards a grade each school year. Data sources for this study were 60 students in grades 3-7 who have been placed in the district's program (Pegasus) for gifted education. Also, an equal number of students from the regular classroom program was randomly selected to participate in the study. The nine identification indices used in this study are:

1. Group IQ test scores - Otis-Lennon School Ability Test (1979), is used to measure the abilities needed to acquire the desired cognitive outcomes of formal education. The test has a mean of 100 and a standard deviation of 16 (OTISSAI).
2. Individual Full Scale IQ test score - This is the most global score yielded by the WISC-R (1974). It gives information about a child's standing in the general population, as represented by the standardization group. The WISC-R has a mean of 100 and a standard deviation of 15 (WISC-R FS) .
3. Individual verbal IQ test score - This score measures a child's

ability to reason with the use of language. This section of the WISC-R concentrates on verbal comprehension skills (WISC-R V).

4. Individual performance IQ test score - This score measures a child's ability to reason without the use of language. This section of the WISC-R focuses on perceptual organization skills (WISC-R P).

5. Teacher Rating Scale (Renzulli, 1981) - This scale is used by the teacher to rate students in the three areas of learning, motivation, and creativity (TEACHER).

6. Metropolitan Achievement Test - Reading Comprehension (1978) - The objectives measured by this test are: vocabulary in context, literal specific, literal global, inferential specific, inferential global, and evaluative reading. Age percentile ranks are used for comparing students' achievement (MATREAD).

7. Metropolitan Achievement Test - Math (1978) - This test measures the strands: numeration, geometry and measurement, problem solving, and operations with laws and properties. Age percentile ranks are used for comparing students' achievement (MATMATH).

8. Parent Questionnaire - This form enables parents to refer their child for testing in the gifted program, and it also provides information from the parents' perspective on children referred by other methods (PARENT).

Methodology:

The purpose of the study was to determine which indices are the strongest discriminators between gifted and nongifted students. The statistical methods used in this study were correlation procedures and discriminant analysis. Means and standard deviations were also obtained for each of the variables. Discriminant analysis

is a multivariate technique used to determine whether measures can discriminate, and therefore classify students into known groups. A stepwise inclusion of variables was used in the procedure. The variables that are poor discriminators are those in which the group means do not show large differences when those variables are analyzed. Also, two or more of the variables may share the same discriminating information even though they are individually good discriminators. When some of these are employed in the analysis, the remainder are redundant. Weak or redundant variables are eliminated. Their presence only complicates the analysis and they may even increase the number of misclassifications. The stepwise procedure selects the most discriminating variables. The sequence in which variables are selected does not necessarily coincide with their relative importance. Because of the intercorrelations, an important discriminator may be selected late, this is due to its unique contributions not being as great as those of the other variables (Klecka, 1985). A good discriminant analysis would yield a good classification analysis, that is, high discrimination between groups and few misclassifications.

Results and Discussion

Means and standard deviations for the variables appear in Table 1. The mean scores on the IQ tests and subtests (WISC-RFS, WISC-RV, WISC-RP, OTISSAI) range from 123-130. The means of the academic achievement tests (MATREAD, MATMATH) are from the 93rd to the 96th percentile. The mean score for the teacher nomination instrument was 83 out of a possible 90 points, and for the parent questionnaire the mean was 36 of a possible 42 points.

TABLE 1

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
WISCRFS	100	126.81000000	11.89745325	12681.00000000	92.00000000	151.00000000
WISCRV	100	123.69000000	12.54945369	12369.00000000	81.00000000	150.00000000
WISCRP	100	124.35000000	13.02862040	12435.00000000	93.00000000	151.00000000
OTISSAI	100	130.26000000	8.48123682	13026.00000000	111.00000000	163.00000000
MATREAD	100	93.30000000	8.26517582	9330.00000000	68.00000000	99.00000000
MATMATH	100	95.92000000	4.89625707	9592.00000000	68.00000000	99.00000000
TEACHER	100	82.56000000	6.60627189	8256.00000000	62.00000000	90.00000000
PARENT	100	36.34000000	4.90767282	3634.00000000	22.00000000	42.00000000
GIFTED	100	0.50000000	0.50251891	50.00000000	0	1.00000000

Those independent variables having a significant correlation coefficient (Table 2) with the dependent variable, gifted, were the WISC-R Full Scale , WISC-R Verbal, WISC-R Performance, Metropolitan Achievement Test Reading, and Parent Questionnaire. These were significant at the p<.0001 level. The Metropolitan Achievement Test Math was found to be significant at the p<.05 level.

TABLE 2

CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / N = 100

	WISCRFS	WISCRV	WISCRP	OTISSAI	MATREAD	MATMATH	TEACHER	PARENT	GIFTED
WISCRFS	1.00000	0.83403	0.81825	0.13033	0.20089	0.19013	0.06678	0.66802	0.81856
	0.0000	0.0001	0.0001	0.1962	0.0451	0.0581	0.5092	0.0001	0.0001
WISCRV	0.83403	1.00000	0.38438	0.09548	0.14163	0.13094	0.01832	0.52114	0.66712
	0.0001	0.0000	0.0001	0.3447	0.1599	0.1941	0.8564	0.0001	0.0001
WISCRP	0.81825	0.38438	1.00000	0.11572	0.18559	0.20692	0.06295	0.55214	0.67344
	0.0001	0.0001	0.0000	0.2516	0.0645	0.0389	0.5338	0.0001	0.0001
OTISSAI	0.13033	0.09548	0.11572	1.00000	-0.00847	-0.00144	0.06137	0.15729	0.16353
	0.1962	0.3447	0.2516	0.0000	0.9333	0.9887	0.5441	0.1181	0.1040
MATREAD	0.20089	0.14163	0.18559	-0.00847	1.00000	0.45737	0.14988	0.25644	0.25536
	0.0451	0.1599	0.0645	0.9333	0.0000	0.0001	0.1366	0.0100	0.0103
MATMATH	0.19013	0.13094	0.20692	-0.00144	0.45737	1.00000	0.07791	0.22940	0.22169
	0.0581	0.1941	0.0389	0.9887	0.0001	0.0000	0.4410	0.0217	0.0266
TEACHER	0.06678	0.01832	0.06295	0.06137	0.14988	0.07791	1.00000	0.56483	0.04260
	0.5092	0.8564	0.5338	0.5441	0.1366	0.4410	0.0000	0.0001	0.6739
PARENT	0.66802	0.52114	0.55214	0.15729	0.25644	0.22940	0.56483	1.00000	0.72086
	0.0001	0.0001	0.0001	0.1181	0.0100	0.0217	0.0001	0.0000	0.0001
GIFTED	0.81856	0.66712	0.67344	0.16353	0.25536	0.22169	0.04260	0.72086	1.00000
	0.0001	0.0001	0.0001	0.1040	0.0103	0.0266	0.6739	0.0001	0.0000

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Relative to the purpose of this study the discriminant analysis procedure (Table 3) determined that the variables WISC-R Full Scale, Parent Questionnaire, and Teacher Nomination were the strongest discriminators between gifted and non-gifted students. All were significant at the p<.0001 level.

Table 3

STEPWISE SELECTION: SUMMARY

STEP	VARIABLE ENTERED	VARIABLE REMOVED	NUMBER IN	PARTIAL R**2	F STATISTIC	PROB > F	WILKS' LAMBDA	PROB > LAMBDA	AVERAGE SQUARED CANONICAL CORRELATION	PROB > ASCC
1	WISCRFS		1	0.6700	199.011	0.0001	0.32995442	0.0000	0.67004558	0.0000
2	PARENT		2	0.1658	19.277	0.0001	0.27525246	0.0000	0.72474754	0.0000
3	TEACHER		3	0.2210	27.230	0.0001	0.21443020	0.0000	0.78556980	0.0000

Wilks' Lambda is close to 0 if any two groups are well separated. The lowest Lambdas in the analysis are Teacher 0.214, Parent 0.28, and WISC-RFS 0.33. The average Squared Canonical Correlation (ASCC) is close to 1 if all groups were well separated and if all or most directions in the discriminant space show good separation for at least two groups. The ASCC for the most sensitive variables are Teacher 0.79, Parent 0.72, and WISC-RFS 0.67.

The posterior probability procedure of membership in gifted indicated there was only one misclassification in the gifted group and only two misclassification in the non-gifted group.

The variables were found to have a moderate degree of multicollinearity. If the variable being tested is a linear combination of one or more variables already entered, its tolerance will be zero. A variable with a small tolerance of less than .001 will be likely to cause inaccuracy in the computing (Klecka,1985).

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None of the variables used in the procedure had tolerance levels of less than 0.2019.

Conclusion

A moderate sample size may have affected the results of this study. A larger sample size and replications of the procedures would be necessary before any results that have been obtained can be considered conclusive. Because of the potential values of eliminating some of the testing and questionnaires associated with identifying gifted students, this study and its results have potential value to gifted education programs.

Educational Significance:

Those indices that are shown not to be significantly strong indicators of gifted students may be reviewed for possible exclusion from the identification procedure. From this study, other research on the indices for discrimination based upon gender, race, SES, or other variables may evolve. The ultimate goal of the study will be to produce an identification procedure that is the most reliable for the placement of students in gifted education programs.

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